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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,801	01/27/2004	Ronald Duane McCallister	2298-030	3261

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EXAMINER	
BAYARD, EMMANUEL	
ART UNIT	PAPER NUMBER
2638	

DATE MAILED: 11/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

UK

Office Action Summary	Application No.	Applicant(s)
	10/766,801	MCCALLISTER, RONALD DUANE
	Examiner	**Art Unit**
	Emmanuel Bayard	2638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7, 11-12, 19, 21, 24, 26-29, 34, 38-43, 47-48 and 51* is/are rejected.

7)☒ Claim(s) *8-10,13-18,20,22,23,25,30-33,35-37,44-46,49,50 and 52* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

This is in response to amendment filed on 8/29/05 in which claims 1-52 are pending. The applicant's amendments have been fully considered but they are moot base on the new ground of rejection.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, 11-12, 19, 21, 24, 26-29, 42-43, 47 are rejected under 35 U.S.C. 102(b) as being anticipated by Twitchell et al U.S. Patent No 6,335,767 B1.

As per claim 1, Twitchell et al discloses a method of managing distortion in a digital communications transmitter in which at least a portion of said distortion is introduced by analog-transmitter components, said method comprising: obtaining a forward-data stream configured to convey digital information (see fig.5 element data stream); training a linear predistorter (see fig.5 element 32 and col.8, lines 46-55) which is responsive to said forward data stream and is located upstream of said analog transmitter components (see fig.5 element 18) to compensate for linear distortion introduced by said analog-transmitter components; and training a nonlinear predistorter (see fig.5 element 28 and col.8, lines 56-60) which is responsive to said forward data stream and is located upstream of said analog transmitter (see fig.5 element 18) components to compensate for nonlinear distortion introduced by said analog-

transmitter components.

As per claim 2, Twitchell et al does teach said linear predistorter comprises a first equalizer (see fig.5 element 32), and said nonlinear predistorter comprises a second equalizer (see fig.5 element 28 and col.8, lines 57-59); said linear-predistorter-training activity comprises operating said first equalizer in an adaptive mode to compensate for said linear distortion; and said nonlinear-predistorter-training activity comprises operating said second equalizer in an adaptive mode to compensate for said nonlinear distortion (see fig.5).

As per claim 3, Twitchell et al inherently teaches said linear pre-distorter-training activity operates said first equalizer in a non-adaptive mode when said second equalizer is operated in said adaptive mode; and said nonlinear pre-distorter-training activity operates said second equalizer in a non-adaptive mode when said first equalizer is operated in said adaptive mode.

As per claim 4, Twitchell et al does teach wherein said nonlinear pre-distorter-training activity occurs after said linear pre-distorter-training activity (see fig.5).

As per claim 5, Twitchell et al does teach wherein said linear-predistorter-training activity comprises determining filter coefficients (see col.8, lines 46-55) for an equalizer which filters said forward-data stream.

As per claim 6, Twitchell et al does teach: down-converting a feedback (see fig.5 elements 50 or 52 or 54) signal obtained from said analog-transmitter components using a digital-subharmonic-sampling downconverter (see fig.5 element 46) to generate a return-data stream; and processing (see fig.5 element 46 also performs the

processing function) said return-data-stream to generate said filter coefficients.

As per claim 11, Twitchell et al does teach wherein: each of said linear-predistorter-training and nonlinear-predistorter-training activities processes a return-data stream obtained from said analog-transmitter components (see fig.5 outputs of element 46); said forward-data stream exhibits a forward resolution is inherently taught by Twitchell; and said return-data stream exhibits a return resolution less than said forward resolution is inherently taught by Twitchell.

As per claim 12, Twitchell et al inherently teaches wherein said return resolution is at most four bits less than said forward resolution.

As per claim 19, Twitchell et al does teach wherein: said analog-transmitter components include a power amplifier which is driven by a power-amplifier-input signal and which produces a power-amplifier-output signal (see fig.5 element 20); and said linear-predistorter-training activity comprises downconverting (see fig.5 element 46) said power-amplifier-input signal then downconverting said power-amplifier-output signal.

As per claims 21, 42, Twitchell et al teaches a digital communications transmitter comprising: a source of a forward-data stream configured to digitally convey information (see fig.5 element data stream); a nonlinear predistorter (see fig.5 element 28) coupled to said forward-data-stream source and configured to generate a nonlinear-predistorted-compensation stream from said forward-data stream (see col.8, lines 55-67); a combiner (see col.4, lines 54-56) coupled to said forward-data-stream source and said nonlinear predistorter and configured to generate a nonlinear-predistorted-forward-data stream from said forward-data stream and said nonlinear-predistorted-

compensation stream; a linear predistorter (see fig.5 element 32) coupled to said combiner and configured to generate a linear-and-nonlinear-predistorted-forward-data stream, said linear-and-nonlinear-predistorted-forward-data stream being routed to analog-transmitter (see fig.5 element 14) components; and a feedback section (see fig.5 element 50 or 52 or 54) having an input adapted to receive an RF-analog signal from said analog-transmitter components and an output (see fig.5 output of element 46) coupled to said nonlinear predistorter (see element 28) and to said linear predistorter (see element 32).

As per claims 24 and 47, Twitchell et al does teach wherein: said nonlinear predistorter comprises a first equalizer (see col.8, lines 45-67) which operates in an adaptive mode to compensate for nonlinear distortion; and said linear predistorter comprises a second equalizer (see col.8, lines 45-67) which operates in said adaptive mode to compensate for linear distortion.

As per claim 26, Twitchell et al inherently teaches wherein: said first equalizer operates in a non-adaptive mode when said second equalizer is operating in said adaptive mode; and said second equalizer operates in a non-adaptive mode when said first equalizer is operating in said adaptive mode.

As per claim 27, Twitchell et al inherently teaches wherein: said nonlinear and said linear predistorters selectively operate in respective training modes; and said linear predistorter operates in its training mode to compensate for linear distortion prior to operating said nonlinear predistorter in its training mode to compensate for nonlinear distortion.

As per claim 28, Twitchell et al teaches wherein said feedback section comprises a digital-subharmonic-sampling downconverter (see fig.5 element 46) adapted to receive said RF-analog signal from said analog-transmitter components and configured to provide a return-data stream (see fig.5 element 50 or 52 or 54). Therefore complex digital-subharmonic-sampling downconverter and complex return data stream is inherently taught by Twitchell.

As per claim 29, Twitchell et al inherently teaches wherein: said forward-data stream exhibits a forward resolution; and said complex-return-data stream exhibits a return resolution less than said forward resolution.

As per claim 43, Twitchell et al teaches wherein said feedback section comprises a digital-subharmonic-sampling downconverter (see fig.5 element 46).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 7, 34, 38-39, 48, 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Twitchell et al U.S. patent No 6,335,767 B1 in view of Sarca US Pub No 20050123066 B1.

As per claim 7, Twitchell et al teaches all the features of the claimed invention except wherein said processing activity controls <u>one or more estimation-and-convergence algorithms</u> to generate said filter coefficients.

Sarca teaches processing activity controls one or more estimation-and-convergence algorithms to generate said filter coefficients (see fig.4 element 74 and page 4, paragraphs [0051-0052].

It would have been obvious to one of ordinary skill in the art to implement the teaching of Sarca into Twitchell as to achieve optimal algorithm in exactly one iteration as taught by Sarca (see page 4 [0051]).

As per claims 34 and 48, Twitchell et al teaches a method of managing distortion in a digital communications transmitter in which at least a portion of said distortion is introduced by analog-transmitter components, said method comprising: obtaining a forward-data stream configured to convey digital information (see fig.5 element data stream); obtaining an RF-analog signal from said analog-transmitter components (see col.4, lines 49-51 and col.9, lines 10-13); generating a return-data stream (see fig.5 elements 50 or 52 or 54) from said RF-analog signal; adaptive determinations (see fig.5 element 46) to train a linear predistorter (see fig.5 element 32) to compensate for linear distortion introduced by said analog-transmitter components; and after training said linear predistorter, applying a second adaptive determination (see fig.5 element 46) -estimation-and-convergence algorithm to train a non-linear predistorter (see fig.5 element 28) to compensate for nonlinear distortion introduced by said analog-transmitter components.

However Twitchell et al does not teach implementing a first and second-estimation-and-convergence algorithms to train a linear and non-linear pre-distorters respectively.

Sarca teaches implementing a first and second-estimation-and-convergence algorithms to train a linear and non-linear pre-distorters respectively (see fig.4 element 74 and page 4, paragraphs [0051-0052]).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Sarca into Twitchell as to achieve optimal algorithm in exactly one iteration as taught by Sarca (see page 4 [0051]).

As per claims 38 and 51, Twitchell and Sarca in combination would teach each of said implementing and applying activities processes said return-data stream; said forward-data stream exhibits a forward resolution and said return-data stream exhibits a return resolution less than said forward resolution as to achieve optimal algorithm in exactly one iteration as taught by Sarca (see page 4 [0051]).

As per claim 39, Twitchell and Sarca in combination would teach wherein said return resolution is at most four bits less than said forward resolution as to achieve optimal algorithm in exactly one iteration as taught by Sarca (see page 4 [0051]).

Allowable Subject Matter

5. Claims 8-10, 13-18, 20, 22-23, 25, 30-33, 35-37, 44-46, 49-50, 52 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bach et al U.S. 6,775,330 B2 teaches a predistorted modulation system.

Twitchell et al U.S. Patent No 6,281,936 B1 teaches a broadcast transmission system.

Danielsons et al U.S. Patent No 6,600,516 B1 teaches a digital RF transmitter.

Jeong U.S. Patent no 6,515,712 B1 teaches a signal distortion compensating.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272 3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vanderpuye Kenneth can be reached on 571 272 3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Bayard
Primary Examiner
Art Unit 2638

11/4/05

EMMANUEL BAYARD
PRIMARY EXAMINER